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APPELLANT'S BRIEF Address to: Mail Stop Appeal Brief-Patents Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450	Application Number	10/633,470
	Confirmation No.	5138
	Attorney Docket No.	10020348-1
	Filing Date	July 31, 2003
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	Examiner	John S. Brusca
	Group Art	1631
	Title: <i>"Method and System for Generating Virtual Microarrays"</i>	

Sir:

This Brief is filed in support of the Appellant's appeal of the rejections set forth in the Office Action dated March 21, 2008. A Notice of Appeal was filed on June 20, 2008. As such this Appeal Brief is timely filed.

The Board of Patent Appeals and Interferences has jurisdiction over this appeal pursuant to 35 U.S.C. § 134(a).

The Commissioner is hereby authorized to charge deposit account number 50-1078, order number 10020348-1 to cover any required fee for filing the Appellant's Brief. Additionally, in the event that the fee transmittal or other papers are separated from this document and/or other fees or relief are required, the Appellants petition for such relief, including extensions of time, and authorize the Commissioner to charge any fees under 37 C.F.R. §§ 1.16, 1.17 and 1.21 which may be required by this paper, or to credit any overpayment, to the above disclosed deposit account.

TABLE OF CONTENTS

<u>CONTENTS</u>	<u>PAGE</u>
Real Party in Interest.....	3
Related Appeals and Interferences.....	3
Status of Claims.....	3
Status of Amendments.....	3
Summary of Claimed Subject Matter	3
Grounds of Rejection to be Reviewed on Appeal.....	5
Argument.....	5
Summary.....	11
Relief Requested.....	12
Claims Appendix	13
Evidence Appendix	15
Related Proceedings Appendix.....	16

REAL PARTY IN INTEREST

The inventors named on this patent application assigned their entire rights to the invention to Agilent Technologies, Inc.

RELATED APPEALS AND INTERFERENCES

There are currently no other appeals or interferences known to the Appellant, the undersigned Appellant's representative, or the assignee to whom the inventor assigned his rights in the instant case, which would directly affect or be directly affected by, or have a bearing on the Board's decision in the instant appeal.

STATUS OF CLAIMS

The present application was filed July 31, 2003 with Claims 1 to 9. During the course of prosecution, the Appellants added new Claim 10, cancelled Claim 8, and amended Claims 1-7 and 9. Accordingly, Claims 1-7, 9 and 10 are pending in the present application, all of which stand rejected. As the claims have been twice rejected by the Office, the Appellants hereby Appeal the case to the Board of Patent Appeals and Interferences pursuant to 35 U.S.C. § 134(a). All of the rejected claims are appealed herein.

STATUS OF AMENDMENTS

No claim amendments were presented subsequent to issuance of the Final Office Action dated March 21, 2008.

SUMMARY OF CLAIMED SUBJECT MATTER

The claimed invention is drawn to virtualizing microarray systems. The systems include (a) a microarray comprising a number of features, each feature containing a type of probe molecule designed to bind a target molecule, and a memory element; and (b) logic that controls a microarray processing component to generate a virtual microarray comprising data describing a subset of the features of the microarray.

A description of each appealed claim and its support from the specification follow below.

Independent Claim 1 recites a virtualizing microarray system (pg. 7, lines 20-23). The system includes (a) a microarray comprising (i) a number of features, each feature containing a type of probe molecule designed to bind a target molecule (pg. 7, lines 23-26, pg. 4, lines 3-20, and pg. 12, lines 13-24); and (ii) a memory element physically associated with the microarray, wherein the memory element comprises data that describes each feature of the microarray (pg. 7, lines 20-23, and pg. 14, lines 26-31); and (b) logic that controls a microarray processing component to generate a virtual microarray comprising data describing a subset of the features of the microarray (pg. 7, line 28 to pg. 8, line 1).

Claim 2 recites the virtualizing microarray system of claim 1 wherein the data describing a feature of the microarray comprises data that identifies a position of the feature within the microarray; data that identifies the type of probe molecules contained in the feature; and data that describes the target molecule of the probe molecules contained in the feature (pg. 13, line 27 to pg. 14, line 25).

Claim 3 recites the virtualizing microarray system of claim 2 wherein the data that describes the target molecule of the probe molecules contained in the feature comprises data that describes an immediate target molecule to which the probe molecules bind (pg. 13, line 27 to pg. 14, line 25).

Claim 4 recites the virtualizing microarray system of claim 2 wherein the data that describes the target molecule of the probe molecules contained in the feature includes data that describes a biological molecule produced by synthesis directed by an immediate target molecule to which the probe molecules bind (pg. 13, line 27 to pg. 14, line 25).

Claim 5 recites the virtualizing microarray system of claim 2 wherein the data that describes the target molecule of the probe molecules contained in the feature further includes data describing molecular function; data describing a biological process; and data describing a cellular component (pg. 13, line 27 to pg. 14, line 25).

Claim 6 recites the virtualizing microarray system of claim 1 wherein the logic comprises logic that controls the microarray processing component to specify masks related to the data describing each feature of the microarray (pg. 1, lines 1-1); and logic that controls the microarray processing component to use the specified masks to filter

the features of the microarray to produce the data describing a subset of the features of the microarray (pg. 17, lines 7 to pg. 18, line 20).

Claim 7 recites the virtualizing microarray system of claim 1, wherein the microarray processing component is selected from one or more of a microarray scanner; a microarray-data processing system; and a microarray-data visualization system (pg. 29, lines 7-9).

Claim 9 recites the virtualizing microarray system of claim 1 wherein the microarray further includes a header, wherein the logic controls the microarray processing component to associate data describing each feature of the microarray with a microarray identified by information contained in the header (pg. 18, line 21 to pg. 19, line 8).

Claim 10 recites the virtualizing microarray system of claim 7 wherein the microarray processing component is a microarray scanner (pg. 15, lines 5-31).

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

- I. Claims 1-6 are rejected under 35 U S C 103 (a) as allegedly unpatentable over Taylor (U.S. Publication No. 2002/0052882) in view of Nova et al (U.S. Patent No. 6,017,496).
- II. Claims 1, 7 and 10 are rejected under 35 U.S.C. 103(a) as allegedly unpatentable over Taylor (U.S. Publication No. 2002/0052882) in view of Nova et al (U.S. Patent No. 6,017,496), and further in view of Ramdas et al (Bio techniques, 31:546-551).

ARGUMENT

- I. **Claims 1-6 are not obvious under 35 U.S.C. § 103(a) over Taylor in view of Nova et al.**

Appellants note that Claim 9 appears to have been inadvertently omitted from the 103 rejection. Appellants suspect that Claim 9, which recites that the microarray further includes a header, was intended to be included in this 103 rejection over Taylor

in view of Nova. The Examiner is requested to clarify this aspect of the rejection in the Examiner's Answer.

In the arguments set forth below, the Appellants will argue the rejected claims in two groups as follows:

Group I: Claims 1-4, 6 and 9; and

Group II: Claim 5.

Group I: Claims 1-4, 6 and 9

Claims 1-4, 6 and 9 are drawn to a virtualizing microarray system. The system includes a microarray and logic. The microarray includes a number of features and a memory element comprising data that describes each feature. The logic controls a microarray processing component to generate a virtual microarray comprising data describing a subset of the features of the microarray. The logic of the claimed invention, as described, for example, on page 15 of the specification, allows for the identification of a subset of features on a microarray which are to be processed and analyzed during the course of the microarray processing stream (thereby excluding the non-identified features during this process). As such, an element of the claimed invention is a microarray system that is configured to produce a virtualized microarray comprising data describing a subset of the features on a single microarray using logic that controls a microarray processing component as is claimed.

In making this rejection, the Examiner asserts that Taylor's virtual microarray in combination with Nova's memory containing data of molecules that are synthesized by an array renders the claims obvious.

In order to meet its burden in establishing a rejection under 35 U.S.C. §103, the Office must first demonstrate that a prior art reference, or references when combined, teach or suggest all claim elements. See, e.g., *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1740 (2007); *Pharmastem Therapeutics v. Viacell et al.*, 491 F.3d 1342, 1360 (Fed. Cir. 2007); MPEP § 2143(A)(1). In addition to demonstrating that all elements were known in the prior art, the Office must also articulate a reason for combining the elements. See, e.g., *KSR* at 1741; *Omegaflex, Inc. v. Parker-Hannifin Corp.*, 243 Fed.

Appx. 592, 595-596 (Fed. Cir. 2007) citing *KSR*. Further, the Supreme Court in *KSR* also stated that that “a court *must* ask whether the improvement is more than the predictable use of prior art elements according to their established functions.” *KSR* at 1740; emphasis added. As such, in addition to showing that all elements of a claim were known in the prior art and that one of skill had a reason to combine them, the Office must also provide evidence that the combination would be a predicted success.

Appellants submit that neither Taylor nor Nova teaches or suggests an element of the rejected claims – i.e., a microarray system that is configured to produce a virtualized microarray comprising data describing a subset of the features on a single microarray using logic that controls a microarray processing component as is claimed.

The Examiner cites paragraphs 28, 29, and 34 of Taylor for this element. See Final Office Action, page 5, lines 10-11. With respect to these paragraphs, the Examiner states in the Advisory Action that, “The applicants cite paragraphs 28, 29, and 34 of Taylor to support the contention that Taylor shows virtual microarrays must be derived from multiple microarrays. However, the cited passages do not state that virtual microarrays must be created from a plurality of microarrays.” Applicants reproduce the cited passages below.

[0028] A class representing a virtual microplate or microarray should support the following actions: creation; display of the virtual microplate or microarray; display of virtual spots or virtual wells; selection of virtual spots or virtual wells; search refinements; deletion of virtual wells and virtual spots; deletion of virtual microplates or microarrays; and saving and loading virtual microplates and microarrays to and from a database.

[0029] A virtual microplate or microarray should be created as the result of a selection of wells or spots either manually or by search process. The dimensions of a virtual microplate or microarray (i.e., rows and columns) should be computed (or recomputed) as necessary.

[0034] A researcher should be allowed to delete a virtual well or virtual spot by selecting a virtual well or virtual spot and indicating to the computing device that the virtual well or virtual spot should be deleted. When this occurs, the virtual well or virtual spot is removed from the virtual microplate or virtual microarray.

Appellants note that, as explained in the previous response, Appellants reproduced the paragraphs solely for the purpose of explaining to the Examiner that the passage merely describes actions that can be executed to produce the disclosed virtual

microarrays. That is, contrary to the Examiner's assertion, the paragraphs cited by the Examiner do not teach using a portion of the data of a single microarray, as recited in the claims.

Appellants further submit that Taylor rather teaches selecting distinct feature data from a plurality of previously-processed microarray data sets to generate a virtual output. The abstract of Taylor defines the virtual microplates disclosed therein as "correspond[ing] to a plurality of physical microplates, the virtual microplate comprising a first virtual well associated with a first physical well of a first physical microplate and a second virtual well associated with a second physical well of a second physical microplate." As such, it is evident that Taylor does not virtualize a single microarray using logic that controls a microarray processing component as is claimed. Rather, Taylor compiles a portion of the data from multiple individual microarrays to create a virtual output.

Indeed, Taylor is concerned with virtual microarrays created from a plurality of microarrays, not a single array, because Taylor's virtual output is designed to meet the "need to organize, arrange, and display for evaluation voluminous, complex data sets from microassay research in an efficient and lucid manner" as described in Taylor's paragraph 0004. Taylor is particularly interested in handling voluminous and complex data sets from a large number of microarrays such as high-throughput screening (HTS) (See Taylor, paragraph 0003). As such, Taylor teaches away from a virtual microarray comprising data describing a subset of the features of a single microarray.

Finding Appellants' previous argument unpersuasive, the Examiner presents the following reasoning in the Advisory Action: "the abstract merely exemplifies virtual microarrays derived from multiple microarrays without teaching away from virtual microarrays derived from a single microarray"; and "[paragraph 4 of Taylor] merely states that microassay data can be voluminous and require data processing for lucidity." However, in the absence of teaching a virtualized microarray comprising data describing a subset of the features on a single microarray as is claimed, stressing the need to organize, arrange, and display for evaluation of voluminous, complex data sets as in Taylor's paragraph 004 would lead one of skill away from the instant claims which

are drawn to virtualizing a single microarray.

Therefore, Taylor neither teaches nor suggests a virtualized microarray comprising data describing a subset of the features on a single microarray. As Nova is cited merely for its teaching of memory components associated with a microarray (and not virtualizing a single microarray), it fails to remedy this deficiency in Taylor.

In the light of the above analysis, the Appellants submit that the combined teachings of Taylor in view of Nova fail to establish a *prima facie* case of obviousness. Reversal of this rejection is thus respectfully requested.

Group II: Claim 5

Claim 5 is drawn to the virtualizing microarray system of Claim 1 and includes all of the limitations of the claims of Group I – e.g., a microarray system that is configured to produce a virtualized microarray comprising data describing a subset of the features on a single microarray using logic that controls a microarray processing component as is claimed. As such, Appellants submit that the claim of this group is not obvious over Taylor in view of Nova for the reasons detailed above for the claims of Group I.

In addition to the limitations specified above, Claim 5 specifies that the data in the virtual microarray includes data describing molecular function, data describing a biological process, and data describing a cellular component of the target molecule of the probe molecules contained in the feature of the microarray. As such, an element of Group II is data describing molecular function, data describing a biological process, and data describing a cellular component of the target molecule of the probe molecules contained in the feature of the microarray.

The Examiner appears to assert that Taylor's disclosure of data including information about the gene and tissue from which a probe is derived teaches this element. See Final Office Action, page 3, last ¶, citing Taylor's pages 6-9.

However, information about the gene and tissue, e.g., a chromosome in which the gene in the sample is located, a tissue/organ from which the sample was extracted as described in Taylor's ¶¶ 138-143, does not describe molecular function, a biological process or a cellular component of the target molecule of a probe molecule. Indeed,

nowhere does Taylor describe such data.

As such, the combination of Taylor and Nova additionally fails to teach this element of Group II and, as such, Claim 5 is further distinguished over Taylor in view of Nova. Accordingly, the Appellants respectfully request that this rejection of Claim 5 be reversed.

II. Claims 1, 7 and 10 are not obvious under 35 U.S.C. § 103(a) over Taylor in view of Nova et al, and further in view of Ramdas et al.

In the arguments set forth below, the Appellants will argue the rejected claims in a single group.

Claims 1, 7 and 9 are drawn to a virtualizing microarray system and includes a limitation of a microarray system that is configured to produce a virtualized microarray comprising data describing a subset of the features on a single microarray using logic that controls a microarray processing component as is claimed.

As discussed in detail for the claims of Group I, neither Taylor nor Nova teach or suggest a microarray system that is configured to virtualize a single microarray using logic that controls a microarray processing component as is claimed. Indeed, Taylor teaches away from this claimed element.

Ramdas is cited by the Examiner for its teaching of automated analysis of microarrays using scanners and computer controlled visualization systems. However, the Appellants submit that these asserted teachings of Ramdas fail to remedy the deficiencies in Taylor and Nova recited above. Specifically, Ramdas fails to teach or suggest a virtualizing microarray system that includes logic that controls a microarray processing component to generate a virtual microarray comprising data describing a subset of the features of the microarray as is claimed.

In view of the arguments above, the Appellants submit that the combined teachings of Taylor in view of Nova and further in view of Ramdas fail to establish a

prima facie case of obviousness. Reversal of this rejection is thus respectfully requested.

SUMMARY

- I. Claims 1-6 are rejected not obvious under 35 U.S.C. § 103(a) over Taylor (U.S. Publication No. 2002/0052882) in view of Nova et al (U.S. Patent No. 6,017,496) because the combination of Taylor and Nova fails to teach or suggest a microarray system that is configured to produce a virtualized microarray comprising data describing a subset of the features on a single microarray using logic that controls a microarray processing component as is claimed.
- II. Claims 1, 7 and 10 are not obvious under 35 U.S.C. § 103(a) over Taylor (U.S. Publication No. 2002/0052882) in view of Nova et al (U.S. Patent No. 6,017,496), and further in view of Ramdas et al (Bio techniques, 31:546-551) because Ramdas fails to make up the deficiencies of Taylor in view of Nova as described above.

Relief Requested

The Appellants respectfully request that all rejections of Claims 1-7, 9 and 10 U.S.C. § 103 be reversed and that the application be remanded to the Examiner with instructions to issue a Notice of Allowance.

Respectfully submitted,

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CLAIMS APPENDIX

1. A virtualizing microarray system, the system comprising:
 - (a) a microarray comprising:
 - (i) a number of features, each feature containing a type of probe molecule designed to bind a target molecule; and
 - (ii) a memory element physically associated with the microarray, wherein the memory element comprises data that describes each feature of the microarray; and
 - (b) logic that controls a microarray processing component to generate a virtual microarray comprising data describing a subset of the features of the microarray.
2. The virtualizing microarray system of claim 1 wherein the data describing a feature of the microarray comprises:
 - data that identifies a position of the feature within the microarray;
 - data that identifies the type of probe molecules contained in the feature; and
 - data that describes the target molecule of the probe molecules contained in the feature.
3. The virtualizing microarray system of claim 2 wherein the data that describes the target molecule of the probe molecules contained in the feature comprises:
 - data that describes an immediate target molecule to which the probe molecules bind.
4. The virtualizing microarray system of claim 2 wherein the data that describes the target molecule of the probe molecules contained in the feature includes:
 - data that describes a biological molecule produced by synthesis directed by

an immediate target molecule to which the probe molecules bind.

5. The virtualizing microarray system of claim 2 wherein the data that describes the target molecule of the probe molecules contained in the feature further includes:

- data describing molecular function;
- data describing a biological process; and
- data describing a cellular component.

6. The virtualizing microarray system of claim 1 wherein the logic comprises:

logic that controls the microarray processing component to specify masks related to the data describing each feature of the microarray; and

logic that controls the microarray processing component to use the specified masks to filter the features of the microarray to produce the data describing a subset of the features of the microarray.

7. The virtualizing microarray system of claim 1, wherein the microarray processing component is selected from one or more of:

- a microarray scanner;
- a microarray-data processing system; and
- a microarray-data visualization system.

9. The virtualizing microarray system of claim 1 wherein the microarray further includes a header, wherein the logic controls the microarray processing component to associate data describing each feature of the microarray with a microarray identified by information contained in the header.

10. The virtualizing microarray system of claim 7 wherein the microarray processing component is a microarray scanner.

Evidence Appendix

No evidence that qualifies under this heading has been submitted during the prosecution of this application, and as such it is left blank.

Related Proceedings Appendix

As stated in the *Related Appeals and Interferences* section above, there are no other appeals or interferences known to Appellants, the undersigned Appellants' representative, or the assignee to whom the inventors assigned their rights in the instant case, which would directly affect or be directly affected by, or have a bearing on the Board's decision in the instant appeal. As such this section is left blank.